

INFORMATION AND COMMUNICATION ABOUT OCCUPATIONAL EXPOSURE IN WORKPLACE

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ABSTRACT

Medical applications of ionizing radiation are essential for protecting and improving human health. The radiological protection objective is to keep doses as low as reasonably achievable, maximizing dose reduction in order to obtain the necessary results for patients in diagnostic and interventional radiology, nuclear medicine and radiotherapy. There is plenty of information, published papers and studies about radiological protection for patients, regarding interventional radiology, nuclear medicine, radiotherapy, biomedical research, among others. Nevertheless, medical and paramedical personnel themselves are also exposed to radiological risks associated with the various uses of radiation in medicine. This paper discusses some considerations about radiological protection in workplace, as well as the need of more accurate information and communication about occupational exposure and potential exposures in medical practice. We believe that this type of information and communication will be helpful for exposed individuals knowingly while voluntarily helping - other than in their occupation - in the care, support or comfort of patients undergoing medical diagnosis or treatment and for visitors of the patients..

1. INTRODUCTION

Medical applications of ionizing radiation are essential for protecting and improving human health and the last past decades, bringing uncountable benefits to the global population. The radiological protection purpose is to keep doses as low as reasonably achievable, maximizing dose reduction in order to obtain the necessary results for patients in diagnostic and interventional radiology, nuclear medicine and radiotherapy. Protection in the medical environment takes into account recommendations and actions on the protection of patients and workers. Occupational exposure includes external and internal ionizing radiation received by workers during the accomplishment of their tasks. There are different types of possible exposure situations to be taken into account in workplace: planned, emergency and existing exposure situations. In Brazil, even though workers are given satisfactory education and training to reduce unnecessary exposure and minimize occupational doses, some actions should be taken to improve education and communication of workers in preventing accidental occupational exposures.

Sensitive to the need of improving risk communication among Brazilian facilities, there was created a group of studies on potential exposure, including analyses, interpretation and communication about the various aspects of risk. The purpose of this group is to research and to communicate recommendations for potential situations in their different dimensions, which include: scope, methodologies, specific practices and regulatory contexts. In the so-called Information Society, where Information and Communication Technologies (ICT) are omnipresent, this group makes use of Internet to spread reliable and accessible information for workers pertaining to medical and industrial facilities.

2. METHODOLOGY

Regarding potential exposures, only few publications develop expressively the issue and some recommendations are not developed, making it difficult to discuss information in a complete and clear way, even from the original publications. For the purpose of this challenge, this workgroup has studied and inter-related 6 official representative publications, as described below:

- IAEA SS 104 (1990) - Potential exposures are treated as an extension of protection to normal exposures, however, this publication concludes that the procedure to translate the principles established by the ICRP of justification and optimization, as well as the principle of individual risk limitation are not directly given, but the publication does not provide specific recommendations. [1]
- ICRP 60 (1991) - Provides the conceptual basis by introducing the first step towards the development of a conceptual framework for protection of potential exposures. [2]
- ICRP 64 (1993) - The purpose of this report is to elaborate the principles and objectives of the ICRP recommendations concerning potential exposure. Also, the publication brings the basic concepts, terminology and methodologies associated with the implementation of the recommendations and provide general guidance on their practical application. [3]
- INSAG 9 (1995) - Discusses and makes available information on nuclear safety in general, concerning issues of international importance. The publication formulates concepts and identifies ongoing issues and conclusions based on the results of the activities. It provides advices concerning exchanging information and / or extra efforts that are needed. [4]
- NEA / OECD N84 (1995) - Analyzes the state of knowledge in potential expositions, articulating the various publications up to that year. [5]
- ICRP 76 (1997) - Although some ICRP publications recommend that potential exposure should be treated together with normal, this publication assumes that in most situations this is not possible, since normal exposure is based on the limits while at the potential exposure the highest doses of the scenario should be considered. ICRP 76 recognizes that these two issues should be dealt separately, but it does not provide specific recommendations. [6]

One of the major problems is that terminologies employed by different specialists, groups and organizations in different contexts assume different meanings and lead to different understandings, resulting in poor communication, even among specialists, about potential exposure concepts and issues [5]. As a matter of fact, the concept of “risk” itself can assume a great variety of meanings. There seem to be a great variety of definitions and interpretations for describing nature and magnitude of risk, making “risk” one of the key terms of particular concern [1]. Many publications discuss the impasses to communicate the concept of risk for radiological protection purposes, as described in the following examples:

- ICRP 64 - (section 7) Before ICRP 60, the Commission used the term "risk" as a synonym for the probability of a harmful effect (fatal cancer or severe hereditary damage). Nevertheless, outside radiation protection field, "risk" has several meanings, including the common sense in everyday language, meaning an undesirable event, including both the probability and the nature of an event. In nuclear safety, "risk" is mostly defined as the mathematical expectation of the magnitude of the undesirable

consequence, which means: the product of the probability and the consequence of the event. In this sense, risk becomes a physical quantity characterized by a magnitude expressed by a unit with no dimension when risk means probability, but with a certain dimension if it means the mathematical expectation of the consequence. This publication already recognized that these different meanings of the word causes considerable confusion in interdisciplinary communications. [3]

- INSAG 9 - (section 6) The word "risk" has several meanings, even though to all of them there is an associated idea of probability. In a number of publications, "risk" is used as synonym of "an event probability with undesirable consequences". In nuclear safety, it is often employed meaning a combination of probability and consequences, sometimes presented as a product of the probability of an event and the magnitude of its consequence. This product is the mathematical expectation of the consequences. [4]
- NEA / OECD N84 – (section 4.1) The word “risk” can be used in a variety of ways and be given several meanings. In the common loose meaning of everyday language, it is the thread of an undesirable outcome, e.g. death or adverse economic consequences. Two common definitions of risk used in technical work are: (a) the probability of a defined unwanted consequence, and (b) the mathematical expectation of consequences, i.e. the annual probability of an accident multiplied by a measure of the consequences if the accident occurs. [5]

Therefore, this communication program is based on the dialogues among the several studied publications. The initial phase of this educational program has been entirely developed and structured to provide answers to most frequently asked general questions regarding workers' understanding about the concept of risk related to potential exposures. All content is accessed free of costs in the web-based system UNIPRORAD.

3. DISCUSSION AND EXPECTED RESULTS

The system UNIPRORAD [7] is a WEB platform with customized tools and functionalities which were developed according to our target public needs, regarding new possibilities of media, like mobile access, feeds of content and information sharing. We expect that the potential of ICTs will contribute greatly to provide information where it is needed, stimulating development in this large country where it is a strong challenge to ensure access to information to as many people as possible, minimizing costs and optimizing results. The content of this educational program includes concepts, definitions and theory about radiological protection and potential exposures. The system UNIPRORAD was developed to provide Brazilian radioactive facilities a complete web-based repository for research, consultation and information [8]. This is particularly important to Brazilian facilities, because to establish a Radiological Emergency Plan, these facilities should take into account all procedures based on both national and international standards, guidelines and recommendations.

In order to provide the discussion as complete as possible, the work implies to inter-relate concepts and recommendations from different working groups from different organizations. Indeed, the question-answer strategy allows to face different publications comparing similarities, understanding differences or analyzing discrepancies among the several valid recommendations. Regarding risk implications, for example, workers are given questions

and answers based on INSAG 9 recommendations, which include the aspects of risk, probability and consequences as components of risk, safety assessments, risk considerations, individual risks, societal risks, probability theories, implication of low probabilities and considerations about potential and normal exposures. In addition, there are presented question-answer dialogues between ICRP publications concerning potential exposures, presenting reflections through new approaches from these recommendations [7].

This educational program aims to offer fair communication, providing relevant, adequate, trustful and understandable information enabling workers to improve their knowledge and actively participate of the decision-making processes and actions that contribute for their own safety and security. It is our aim to spread information wherever it is needed and to make this system a reference for all Brazilian spoken countries.

4. FINAL CONSIDERATIONS

It is a must to provide workers accessible trustful information about occupational exposure in normal and emergency situations in industrial and medical contexts. Regarding radiological protection in medicine, there are taken into account recommendations about protection for patient doses in medical exposures. Action plans for the radiological protection of patients include the development of guidance materials about interventional procedures, patient exposure tracking and protection of special groups, such as pregnant women and children. Also, there should be always observed the principle of justification, avoiding unnecessary procedures, and optimization, keeping doses as low as reasonably achievable to obtain the necessary results for patients in diagnostic and interventional radiology, nuclear medicine and radiotherapy.

On the other hand, occupational exposure is another concern, and it is a need to promote knowledge and increase discussions about radiological protection among medical and paramedical personnel, who are themselves also exposed to radiological risks associated with the various uses of radiation in medicine. This educational program provides more accurate information and communication about occupational exposure and potential exposures in workplace, offering instruction and professional knowledge for workers to refresh their professional development. This type of information and communication can be also helpful for exposed individuals knowingly while voluntarily helping - other than in their occupation - in the care, support or comfort of patients undergoing medical diagnosis or treatment and for visitors of the patients.

5. REFERENCIAS

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